22. *Globigerina cretacea*, D'Orb	5. GLOBIGERINA.
23. ——— *marginata*, Reuss.	
24. *Planorbulina ammonoides*, Reuss.	6. PLANORBULINA.
25. *Planulina ariminensis*, D'Orb.	
26. *Pulvinulina Micheliniana*, D'Orb.	7. PULVINULINA.
27. *Rotalia umbilicata*, D'Orb.	8. ROTALIA.

NOTICES OF MEMOIRS.

I.—GEOLOGY OF NEW HAMPSHIRE.

IN 1868 a Geological Survey of the State of New Hampshire, U.S.A., was ordered by the Legislature. C. H. Hitchcock was appointed Director; J. H. Huntington, G. L. Vose, Geological Assistants; C. A. Seely, Chemist; and Arthur M. Edwards, Microscopist. Three brief annual reports of progress have been made, amounting in the aggregate to 155 pages octavo, with two maps; the first of the *Ammonoome Gold Field*, and the second one of the whole State, upon the scale of ten miles to the inch, designed to show the distribution of granite and the progress of triangulation for the year 1870. The latter map shows nine geological distinctions.

The work performed has been geological, topographical, and meteorological. As no good maps existed, the first object aimed at was the determination of the exact geodetical points by triangulation. Using the stations of the Coast Survey for a basis, E. T. Quimby and G. L. Vose made satisfactory progress in establishing the latitudes and longitudes of several prominent mountain peaks. The former gentleman is continuing the work under the direction of the United States Coast Survey, who are authorized by Congress to expend funds for triangulation in all interior States where Geological Surveys are in progress. A new map of the whole State, upon the scale of two miles and a half to the inch, which will serve as the basis for the geological delineation, is nearly ready for the engraver. Models of the White and Franconia Mountains have been executed in plaster, upon a large scale.

The second report gives a general classification of the rocks. The geology of this State is so intricate that no one has ever attempted to map the formations. Maps of the northern part of the Continent, such as Logan's, leave this territory entirely blank, unless they be on a minute scale like Lyell's, or E. Hitchcock's maps of the United States (1853), where it all appears as "Primary." It has, however, been the field for conflicting theories. We have first the ancient idea of a central granitic nucleus, illustrated by Jackson's Report and all earlier writers. Succeeding this came a general belief that the gneisses and granites were "Primary." Subsequently most American geologists adopted the theory that the New England gneisses were all metamorphosed Palæozoic strata; and Logan, Sterry Hunt and J. P. Lesley are on record as affirming the rocks of the White Mountains to be Devonian. The researches of the present Survey indicate a return to the older view that these rocks are largely Eozoic. The discoveries of the past year (1871), not yet reported, seem to confirm the anticipations

of the printed statements. Without giving the reasons for new views, the following may be presented as the probable ages and arrangements of these metamorphic groups.

First, of *Laurentian* age, is a central and interrupted area of Porphyritic gneiss and granite. This is flanked in the more southern counties by wide bands of gneiss, having similar mineralogical characters upon both sides, each capable of satisfactory subdivision. Next come several isolated patches of the *Labradorian* group of the Canada Survey, or the *Norian*[1] of Hunt, characterized chiefly by the presence of the mineral labradorite, now for the first time discovered *in sitû* in New England. An extensive compound of labradorite and chrysolite has received the name of *Ossipyte*.[2] An extensive series of felsites, granites and jaspers seem to belong nearly to this period. Next is a large amount of *Andalusite gneiss*, found both among the White Mountains and in the southern districts. This has been referred to the "White Mountain Series," or the Lower Cambrian, by Dr. Sterry Hunt, in his Address before the American Association for the Advancement of Science, 1871. It seems to be stratigraphically distinct from the Norian rocks, though not so easily separated from the supposed Laurentian gneisses. All the rocks thus far mentioned are clearly Eozoic, and unconformably underlie all the others. Apparently the lowest of the Palæozoic division is the series of slates and schists, to which the name of *Coös group* has been given in the second report. This is synonymous with Hunt's *Terranovan series* in part, by him referred to the base of the Silurian. In New Hampshire this group contains the minerals andalusite, staurolite, and syenite in great abundance; or silicates of alumina without alkalies. A great band of it lies along Connecticut river for over a hundred miles, invariably resting upon the edges of the Eozoic gneisses. Its stratigraphical relations were determined before the suggestion of the term Terranovan. A band of mica-schist and quartzites along the Merrimack river must be of nearly the same age. This "Merrimack group" occasionally carries andalusite schists, and crops out upon Mounts Pequawket and Washington. Next come the green schists usually called talcose, and the equivalent of the metamorphic portion of the "Quebec Group" of Sir W. E. Logan. This is found along Connecticut river, widening in the extreme northern part of the State. Recently Credner, Macfarlane, and Hunt have referred this talcose band to the Huronian of Logan, which is probably Eozoic. Scattered over this Quebec area are several patches of clay-slates; two of the "Calciferous Mica Schist" of the Vermont Reports, and one of Helderberg limestone (Devonian), with fossils. The slates are allied to the "Gaspe slates" of Canada, which are thought to be Upper Silurian. Logan refers the mica-schists to the same age.

New Hampshire furnishes a fine field for the study of the markings left during the Glacial period. Transported boulders have been discovered 5,800 feet above the sea-level upon Mount Washington. The striæ at 5,200 feet course south-easterly, and indicate that the ice moved up and over the peaks. In other parts of the State the striæ

[1] Amer. Journ. Sci., ii., vol. xlix., p. 180. [2] Ibid., iii., vol. iii., p. 49.

seem to have followed the directions of the greater valleys, whether east, south-east, south, or S. 20° W. Along the sea-shore are marine deposits of the Champlain or Post-Pliocene period.

The meteorological work consisted in the establishment of an observatory, during the winter of 1870–71, upon the summit of Mount Washington, 6293 feet above the sea, the station being subsequently adopted by the "Signal Service of the War Department" of the General Government. The experiences of the party resembled greatly those reported by explorers in the Arctic zone. The observations were reported daily for the press, and have been printed in the Geological Report for 1870, as well as a popular account of the writer's experiences, entitled "Mount Washington in Winter." Boston.

II.—Notes on the Geology and Mineralogy of the Island of Lundy. By Townshend M. Hall, F.G.S.

[Transactions of the Devonshire Association for 1871.]

REFERRING first to previous geological observations on the Island, the author then describes its Physical Geography and Geological Structure.

The principal part of Lundy Island is composed of granite, the south-eastern corner, however, consists of slate. In their petrological characters, as well as in their general appearance, these silvery slates closely resemble those of Ilfracombe or Morthoe in the North Devonian group. Judging, however, from the general east and west strike of the North Devon series, these Lundy Island slates would naturally come on the horizon of either the Pilton-beds (uppermost Devonian), or the Carboniferous shales (or Culm-measures) of the mainland, which Mr. Hall regards as occupying a position between the Devonian and the Millstone Grit. No fossils having hitherto been discovered in Lundy, it is found most difficult to prove to which of the two systems the slates should be referred, especially as in North Devon the two great systems (as Mr. Hall remarks) pass quite insensibly one into the other, without any distinct line of separation between them—a fact of great importance in the grand Devonian question.

That the slates of Lundy existed before the intrusion of the granite is shown by the very abrupt manner in which they are cut off by it. The granite is generally similar to the other isolated masses of the same rock in the west of England. Schorl is not abundant as a component, but there are occasionally thin irregular veins of a fine grained granitic substance (eurite?) traversing the rock. Many years ago the Rev. D. Williams described the granite of Lundy as occupying a dyke having a north-east and south-west direction, having a similarity, as regards mode of occurrence, to the little patch of granite or syenite which Mr. Leonard Horner first pointed out at Hestercombe, near Taunton, 69 miles distant. These granites are therefore different from the "domes" or larger masses in Devon and Cornwall. Mr. Hall discusses the connection which has been supposed to exist between these two granitic dykes. Their eruption he

considers to have taken place since the deposition of the Carboniferous strata.

Another feature in the geology of Lundy is the occurrence of intrusive dykes of greenstone, which penetrate both the granite and slate.

Mr. Hall gives also a list of the minerals found in the Island. In the granite there occur Beryl, Felspar, Fluor, Garnet, Mica, Rock Crystal, and Schorl. In the slates are found Blende, Towanite, Magnetite, Quartz, and a Zeolite. H. B. W.

III.—List of Minerals found in Somersetshire.

By Horace B. Woodward, F.G.S.

THE subjoined list of minerals occurring in Somersetshire is chiefly compiled from "Bristow's Glossary of Mineralogy;" "Hall's Mineralogist's Directory;" a MS. Catalogue of Minerals from West Somerset, by S. G. Perceval, preserved in the Taunton Museum; the publications of the Geological Society of London, etc. It may perhaps prove useful to local observers. H. B. W.

Alabaster	*Rhætic, Keuper.* Watchet; Near Somerton.
Amethyst	*Dolomitic Conglomerate,* Near Bristol, Cheddar.
Aragonite	*Keuper, Devonian,* Broomfield, Near Cutcombe, Blue Anchor, Taunton.
Barytes	*Lias,* Harptree. *Keuper, Mountain Limestone,* Clevedon, Dolberry, Watchet, Nether Stowey, Doddington.
Bornite	Broomfield.
Calamine	*Dolomitic Conglomerate, Mountain Limestone,* Mendips, Broadfield Down.
Calcite	*Passim.*
Celestine	*Oolite,* Collier's Lane, near Bath. *Keuper,* Bedminster, Chew Magna, Wells, Blue Anchor, Watchet.
Chalybite, Spathose Iron Ore	*Devonian,* Exmoor, Brendon.
Chessylite	*Devonian* (?), Doddington, Nether Stowey.
Copper	Broomfield, Hutton, Near Wookey Hole.
Copperas	*Fuller's Earth,* Widcombe.
Galena (Argentiferous)	*Oolite, Lias, Rhætic, Dolomitic Conglomerate, Mountain Limestone,* Mendips, Broadfield Down. *Devonian,* Treborough.
Göthite	Near Bristol. *Devonian,* Exmoor, Raleigh's Cross.
Hematite	*Mountain Limestone,* Mendips. *Devonian,* Main Down, Brendon, Porlock.
Leadhillite	*Devonian* (?), Kingston, near Taunton.
Limonite	*Mountain Limestone,* Mendips. *Devonian,* Brendon, Exmoor.
Malachite	*Devonian* (?), Doddington, Nether Stowey.
Manganese	*Mountain Limestone,* Shutshelve, Wookey Hole, Near East Harptree. *Devonian,* Raleigh's Cross.
Manganite	Near Bristol, Mendips, Churchill, etc.
Mendipite	Churchill.
Mimetene	Near Blagdon. (Mr. R. H. Valpy, F.G.S.)
Psilomelane	Mendips. *Devonian,* Brendon.
Pyrites	*Passim.*
Quartz	*Passim.*
Rock Salt	Pseudomorphous crystals. *Rhætic, Keuper,* Wells.
Selenite	*Lias, Rhætic, Passim.*
Smithsonite	*Mountain Limestone,* near Bristol, Mendips, Shipham, etc.
Specular Iron Ore	*Devonian,* Raleigh's Cross.
Wulfenite (?)	Churchill.

[1] "Drift Deposits of Manchester and its Neighbourhood."—Manchester Literary and Philosophical Society's Memoirs, vol. viii.